

# User Manual

# KMW200CCD

Water Chiller Unit for CCD Detectors

**January 24, 2003**  
**Version 1.1**

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**oxford diffraction**



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## Important Information

This user manual is intended to help the user operate the KMW200CCD water chiller unit manufactured in Poland by Oxford Diffraction.

Product: KMW200CCD  
Model Type: CCD chiller unit  
Electrical Ratings: 1/N AC 230 V  
50/60 Hz  
450 Watts

## Before attempting to operate the system, PLEASE READ THE INSTRUCTIONS.

This product should only be used by persons legally permitted to do so.

If the equipment is used in a manner not specified in the User Manual, the protection provided by the equipment may be impaired.

### Important Health and Safety Notice

When returning components for service or repair it is essential that the item is shipped together with a signed declaration that the product has not been exposed to any hazardous contamination or that appropriate decontamination procedures have been carried out so that the product is safe to handle.

Care has been taken to ensure the information in this manual is accurate and at an appropriate level. Please inform Oxford Diffraction if you have any suggestions for corrections or improvements to this manual.

This users' manual has been written according to standard 89/392/EEC and further modifications.

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# 1. Health and Safety Information

## 1.1 General

In normal operation the system is designed to operate safely. All users of the KMW200CCD water chiller unit should be aware of potential hazards which exist in and around equipment of this type and the ways of avoiding possible injury and equipment damage which may result from inappropriate ways of working. A description of such potential hazards and how to avoid them is given in this section.

This manual adopts the following convention:

**WARNING**

**Indicates a potential hazard which may result in injury or death**

**CAUTION**

**Indicates a potential hazard which may result in damage to equipment**

Warning symbols on the equipment are:



**Protective conductor terminal**



**Earth (ground) terminal**

**CAUTION**

**Risk of electric shock**

**CAUTION**

**Refer to accompanying documents**

See original manufacturers' manuals for further safety data on third party equipment supplied with the system. A list of these is given in this manual.

**WARNING**

**Do not take risks. You have a responsibility to ensure the safe condition and safe operation of equipment.**

## 1.2 Electrical Safety

In normal use the user is protected from the dangers associated with the voltage, current and power levels used by the equipment. Only suitably qualified personnel should attempt to disconnect, dismantle or modify the equipment.

### 1.2.1 Potential Electrical Hazards

The following list is not intended as a complete guide to all the electrical hazards on the system, but serves to illustrate the range of potential hazards that exist:

- electric shock
- electric burn
- fire of electrical origin
- electric arcing

### 1.2.2 Recommended Precautions

**WARNING**

**All of the electrical equipment supplied as part of the system should be provided with a protective ground. Do not remove protective grounds as this may give rise to an electrical safety hazard. It is vitally important that the system is properly grounded at all times.**

**Follow local and national electrical regulations and procedures.**

**Do not defeat interlocks, remove connectors, disconnect equipment, open safety covers, dismantle or modify equipment unless you are qualified and authorised to do so and you are fully conversant with its operation and potential hazards or have total assurance through your local electrical permit to work system that the equipment has been made safe.**

**Make sure that the mains supply is fused at an appropriate rating and that it can be isolated locally via a clearly labelled, clearly visible and easily accessible isolating switch. Isolate the supply before carrying out any maintenance work.**

### 1.2.3 First Aid

A course in first aid to include methods of artificial respiration is recommended for those whose work involves equipment which may produce a high voltage.

**WARNING**

**Do not attempt to administer first aid to someone who may have suffered electric shock until the source of the shock has been isolated.**

**Mains voltages are present in the system. These can cause serious injury or death.**

**Only personnel qualified and experienced to work with such currents and voltages should perform service or maintenance work on this equipment.**

## 1.3 Mechanical Handling Safety



### **WARNING**

Lifting points are provided for safe handling of components and safe handling practice must be observed to comply with local regulations. Check that lifting points are used only for the job intended. The system itself and some components are heavy and require careful handling. Use safe lifting procedures for heavy items to prevent possible strain injury.

## 1.4 Safe Mechanical Practice

In normal use personnel are not required to undertake mechanical work. However, servicing or repair may necessitate access to any part of the system. Only suitably qualified personnel should attempt to dismantle, modify or repair equipment.

Water connections should be made and tested in accordance with any local and national safety regulations.

## 1.5 Moving Parts

There are a number of moving parts in the system which are powered by electric motors.



### **Warning**

**Injury could result if clothing or body parts become caught in moving mechanisms.**

**Keep clothing, hands etc. away from moving mechanisms.**

## 1.6 Modifications and Service

The manufacturer will not be held responsible for the safety; reliability or performance of the equipment unless assembly operations, extensions, re-adjustments, modifications and repairs are carried out only by persons authorised by the manufacturer. It should be stressed that those parts of the equipment which are interchangeable, and which are subject to deterioration during operation, may significantly affect the safety of the equipment.

## 2. Introduction

### 2.1 Scope

This manual applies to the KMW200CCD water chiller unit designed and manufactured by Oxford Diffraction.

### 2.2 How to Use This Manual

This manual is aimed at operators of the KMW200CCD who should be trained laboratory technicians and should have been trained to use the KMW200CCD by Oxford Diffraction personnel.

This manual is intended to provide operators with a practical guide to the system and its operation. This is intended to familiarise the operator with how the system works and provide a better understanding of the system operation.

All personnel who are likely to operate the system or come into contact with any of the system components should read the **SAFETY** section of the manual. This provides basic information aimed at highlighting the safety hazards associated with the equipment.

The purpose of this manual is to:

- explain how to operate the equipment
- explain how to interface to the equipment
- list performance characteristics of the equipment
- describe how the equipment operates
- assist with simple fault finding and maintenance

### 2.3 System Description

The KMW200CCD is a stand-alone chiller unit intended for indoor use. It is designed for use with Oxford Diffraction CCD detectors.

The chiller has the following purposes:

To stabilise the temperature of the cooling water that is supplied to the CCD detector

To electronically control the flow of water to the CCD detector.

To control the supply of power to the CCD detector



## 3. Specifications

### 3.1 Environment

Ambient temperature	10°C to 35°C
Storage temperature	10°C to 40°C
Relative humidity	10 – 95% non – condensing
Location	Inside a building

### 3.2 Performance Data

Water flow	1.0 l/min
Water temperature	12-14 °C
Temperature stability	± 2 °C
Water reservoir capacity	20 l

### 3.3 Electrical Services

Power connection	1/N AC 230V, 50/60 Hz
Maximum power consumption	450 W
Maximum mains current	2.5 A
CCD output power consumption	Up to 450 W
Main fuse	T2.5 A

### 3.4 Water Supply

Reservoir water	Optically clear, neutral pH, de-ionised water
Connections	Designed for pipes of size 10 x 3 mm, secured with hose clamps

## 4. Technical Description

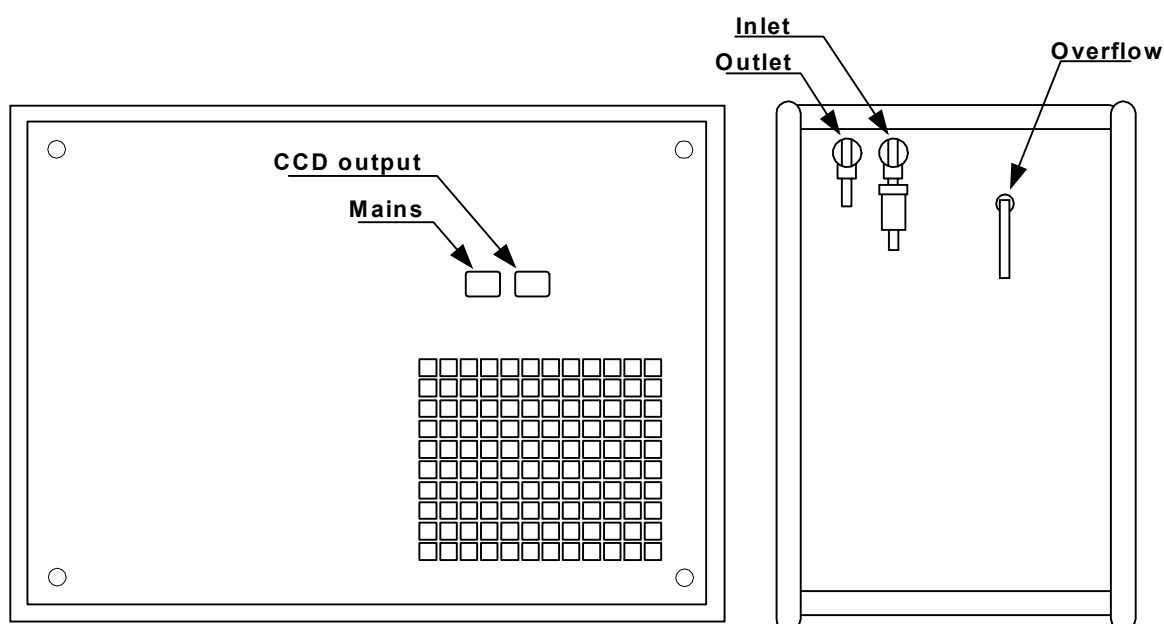
### 4.1 Overview



*Figure 4.1.1 Front View of KMW200CCD Water Chiller*

The KMW200CCD Chiller consists of a metal cabinet containing a water reservoir, a compressor with a radiator, and control circuitry.

Controls and indicators are located on the front panel of the chiller. Electrical connections are located on the side of the chiller, with water connections and an overflow pipe being located on the back of the chiller.



*Figure 4.1.2 Side and Back Views of the KMW200CCD Water Chiller*

4.2 Operating Principles

Inside the KMW200CCD, the compressor is connected to a radiator that is immersed in the water reservoir. A thermostat connected to the compressor ensures that the temperature of the water in the reservoir stays in the range 12-14 °C (or higher depending on the dew point of the operating environment), as required by the CCD detector.

The control circuitry of the KMW200CCD has a logic unit. The logic unit checks signals from:

- 1. Temperature and water level sensors inside the water reservoir
- 2. A flow sensor
- 3. The water pump
- 4. The compressor

Refer to Figure 4.2.1 for a schematic diagram of the control circuit.

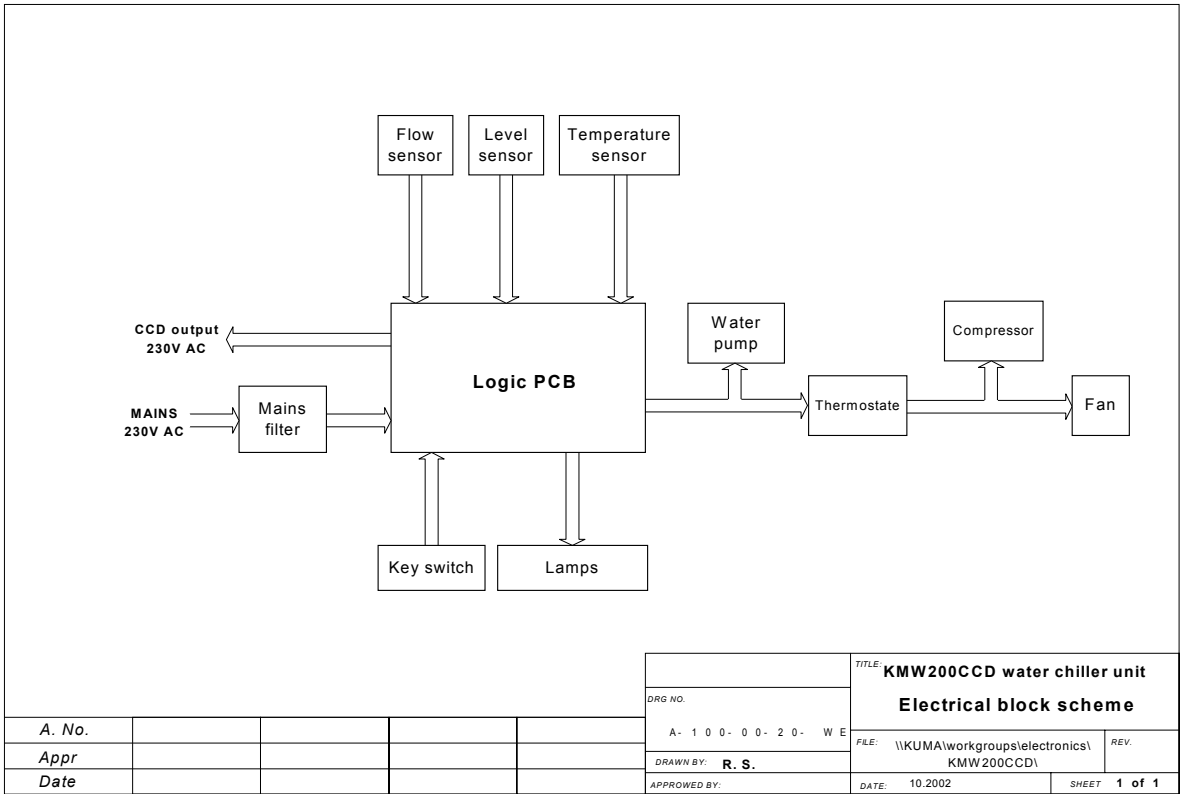


Figure 4.2.1 Schematic Diagram of the Control Circuit

4.2.1 Water Conditioning Check

The KMW200CCD performs a water conditioning check when it is initially switched on. This check looks at:

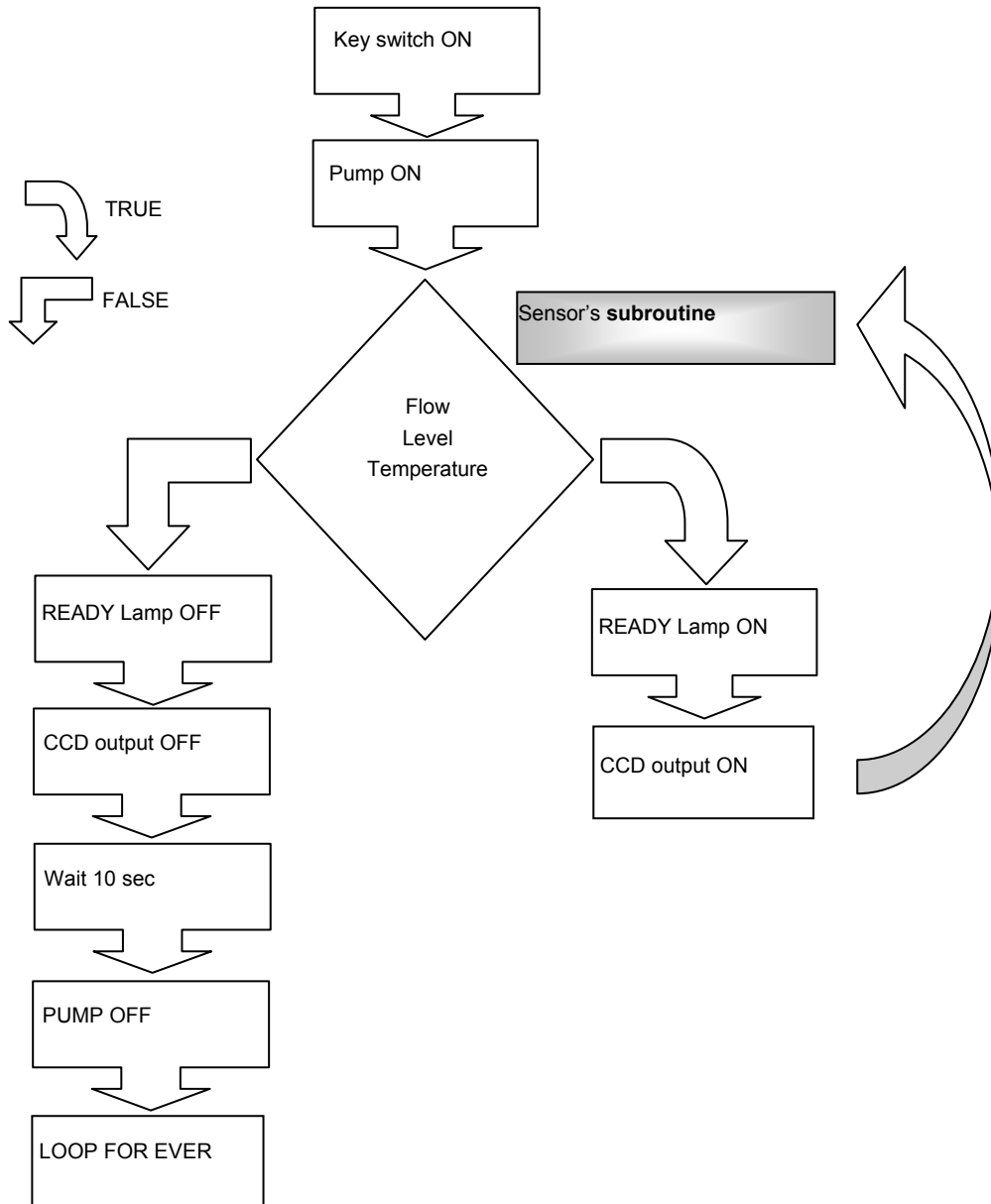
- 1. The flow rate of the water

2. The level of the water in the reservoir
3. The temperature of the water in the water reservoir

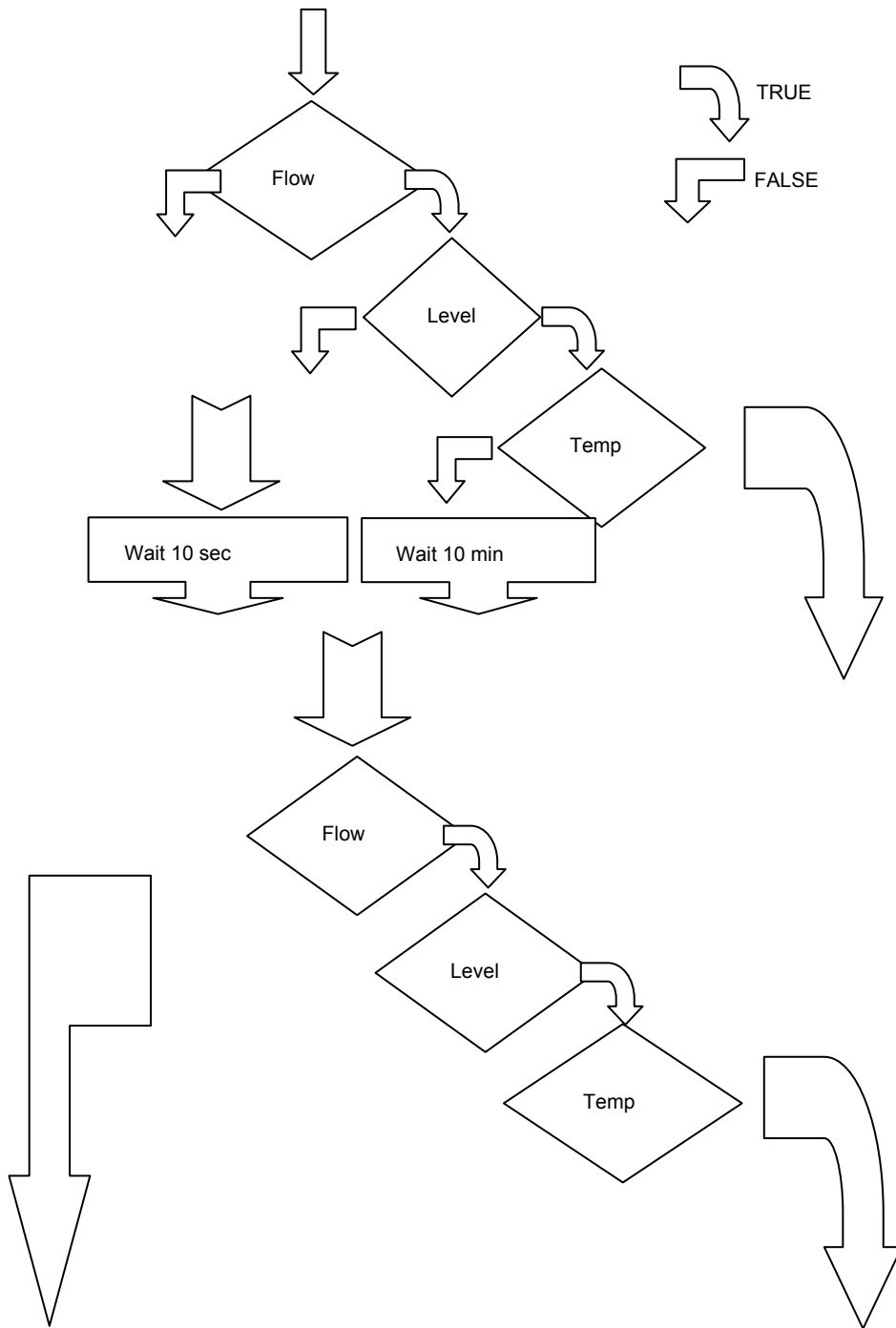
The pump stops after 10 seconds if either the rate of water flow, or the water level in the reservoir, is too low.

The pump stops after 10 minutes if the water temperature in the water reservoir exceeds 18°C.

The state of the unit is displayed on four status lights on the front panel.



**Figure 4.2.2 Water Conditioning Check Routine of the KMW200CCD**



*Figure 4.2.3 Sensor's Subroutine Flow Chart*

## 4.3 Interfaces

### 4.3.1 Water Supply

Two water connections are located on the back panel of the KMW200CCD. The connectors are combined with manual valves and filters. The connectors are screw type and are designed for pipes of size 10 x 3 mm.

### 4.3.2 Electrical Connections

CON1		
1	MAINS socket A	J1-1
2	MAINS socket B	J1-2
3	Key switch A	J2-1
4	Key switch B	J2-2
5	Pump and compressor powering A	J3-1
6	Pump and compressor powering B	J3-2
7	CCD socket A	J4-1
8	CCD socket B	J4-2
CON2		
16	Temperature sensor A	J5-3
15	Temperature sensor B	J5-2
14	Flow sensor GND	J5-1
13	Flow sensor SIGNAL	J6-3
12	Level sensor A	J6-2
11	Level sensor B	J6-1
10	Not connected	
9	Not connected	
8	Flow sensor +5V	J7-1
7	Lamp common	J8-3
6	Not connected	
5	Not connected	
4	LEVEL status light	J9-2
3	TEMP status light	J9-1
2	FLOW status light	J8-2
1	READY status light	J8-1

## 5. Handling, Installation, Storage and Transit Information

### 5.1 Reception and Handling

#### 5.1.1 Delivery

The following steps should be carried out on delivery of the system and before unpacking the KMW200CCD chiller.

1. When the system arrives, check that there is no visible damage, with the delivery driver present. If damage has occurred contact the carrier and Oxford Diffraction **immediately**.
2. Check that shock-watch and tilt indicators fitted to the outside of the packing case have not been activated. If the indicators have been activated notify Oxford Diffraction **immediately**.
3. Check the number of delivered items against the packing list. If any items are missing contact Oxford Diffraction within 3 days.

**WARNING**

The packing crate is heavy and could cause serious injury and damage to the equipment if not handled correctly. Use suitable lifting equipment and procedures. Only lift the packing case from the bottom.

**CAUTION**

Do not remove the equipment from the packing crate until it has been moved to its designated installation site. The equipment has been carefully packed to protect the equipment from damage in transit. Removal of the packing equipment could make the equipment vulnerable to damage during transit.

4. Always lift the packing case from the bottom using suitable lifting equipment (refer to list of component weights in the following section).
5. Move the packing case into the designated installation site.

#### 5.1.2 Unpacking

1. Retain all packing material until installation of the system is completed.

#### 5.1.3 Weights, Dimensions and Lifting Points

Description	Weight kg	Dimensions (width x height x depth) cm	Centre of gravity	Lifting points
KMW200CCD Chiller	55	38 x 54 x 75	Centre of unit	Underneath at the four corners

## 5.2 Installation and Setting to Work

### 5.2.1 Preparation of Site and Services

#### 5.2.1.1 Environmental Requirements

It is the customer's responsibility to ensure that all local building and safety regulations are met.

Ensure that the environmental conditions of the installation site conform to the requirements stated in the SPECIFICATIONS section of this manual.

#### 5.2.1.2 System Layout

The minimum distance between the back, or side of the casing, and other equipment must be greater than 30 cm.

Do not place the KMW200CCD close to any other heat-producing equipment.

#### 5.2.1.3 Electrical Services

The electrical supply must conform to the requirements stated in the SPECIFICATIONS section of this manual.

Locate the electricity supply close to the system and provide:

Phase	L
Neutral	N
Protection	PE

The mains plug should be readily reachable by the operator when the equipment has been installed.

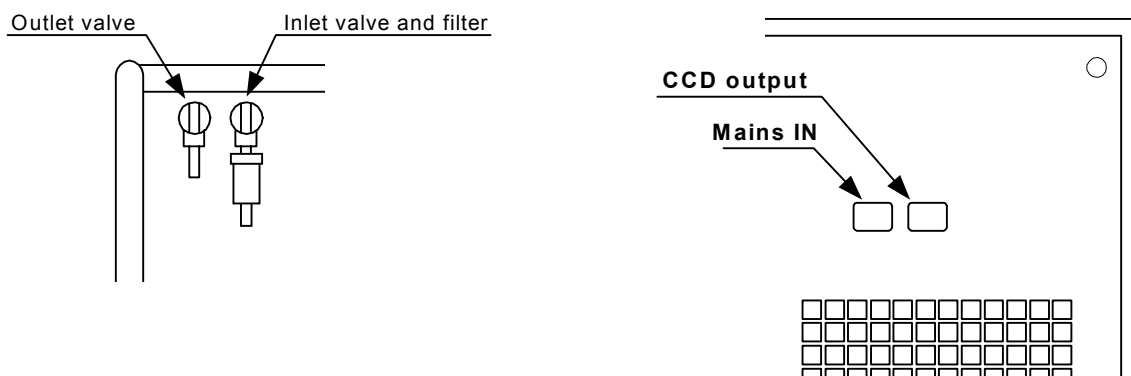
#### 5.2.1.4 Water Supply

Prepare 20 litres of clean distilled water to fill the reservoir.

### 5.2.2 Setting to Work

The location of connectors on the KMW200CCD is shown in figure 5.2.1.





**Figure 5.2.1** *Electrical and Water Connections on the Back and Side of the KMW200CCD*

### 5.2.2.1 Equipment Required

20 litres of distilled water

Bucket

Funnel

Power cable for Oxford Diffraction CCD detector

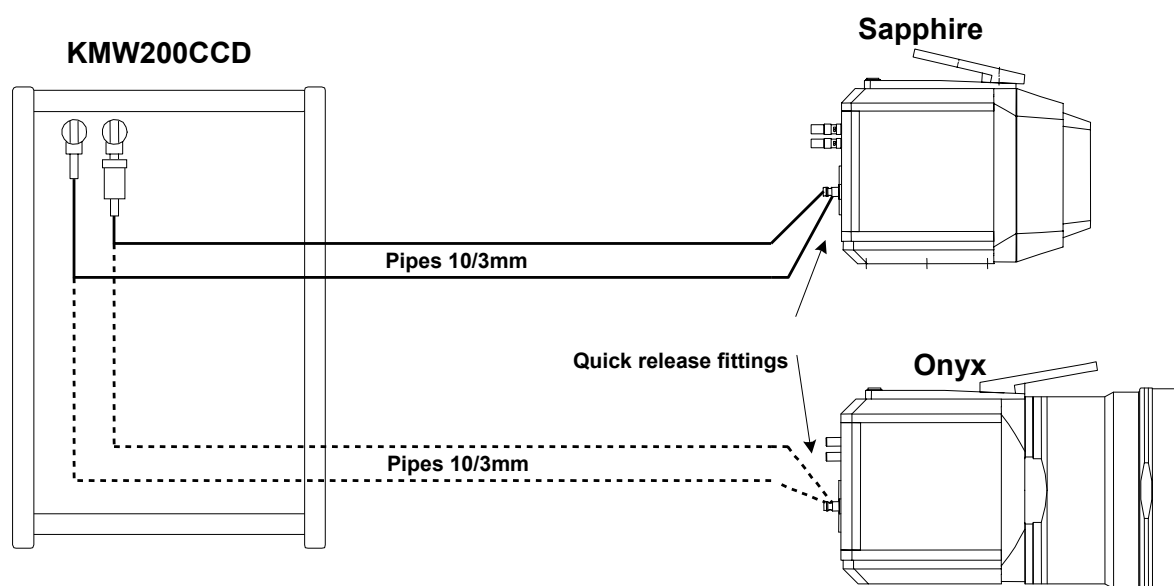
Mains power cable for KMW200CCD

Water pipes (x2, thickness 10 x 3 mm)

### 5.2.2.2 Setting up Procedures

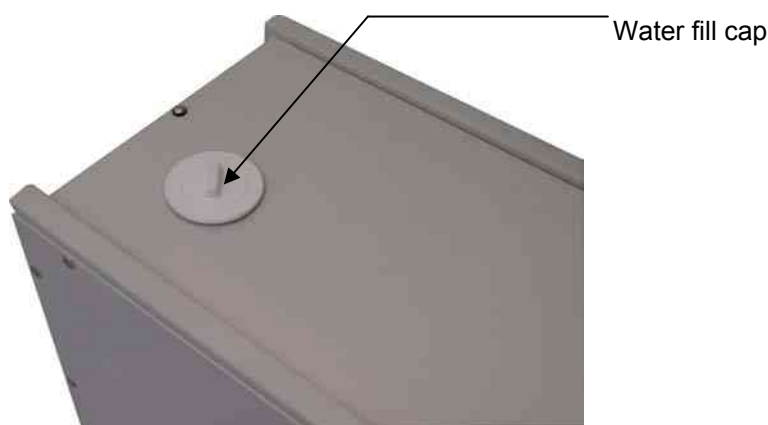
1. Connect the water pipes between the CCD detector and the KMW200CCD. Refer to figure 5.2.2

**NOTE:** Water can flow through the Oxford Diffraction CCD detector in either direction.



**Figure 5.2.2** *Water pipe connection between KMW200CCD, Sapphire series and Onyx CCD detectors*

2. Remove the water fill cover located on the top of the KMW200CCD. Refer to figure 5.2.3.



*Figure 5.2.3 Top view of the KMW200CCD showing the water refill cap*

3. Place a bucket under the overflow pipe at the rear of the KMW200CCD.



**WARNING**

**Do not allow water to splash on the electrical circuits of the KMW200CCD. Failure to do this could cause an electrical shock hazard, and possible damage to the equipment.**

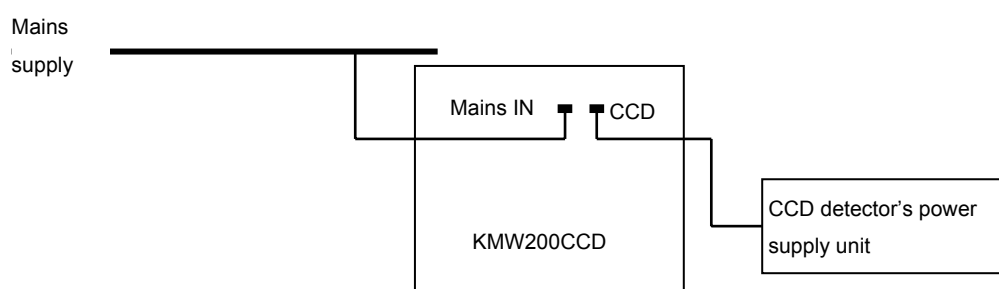
4. Using the funnel, fill the reservoir with water, until water starts to come out of the overflow pipe.
5. Refit the water fill cover on the KMW200CCD.
6. Open the manual valves on the side of the KMW200CCD.



**CAUTION**

**When inserting the CCD detector power supply cable into the KMW200CCD, ensure that the connectors are pushed home firmly.**

7. Connect the power cable for the CCD detector between the connector on the CCD detector power supply and the socket marked as CCD on the KMW200CCD. Refer to figure 5.2.4.



*Figure 5.2.4 Electrical power supply to the KMW200CCD*

8. Plug the KMW200CCD power cable into the socket marked **Mains IN** on the KMW200CCD.
9. Plug the other end of the KMW200CCD power cable into the mains electrical supply.
10. The KMW200CCD is now ready to use.

## 5.3 Storage

Before installation commences, or when the system is not being used for extended periods, store the KMW200CCD in accordance with the environmental conditions for temperature and humidity stated in the SPECIFICATIONS section of this manual.

Always store the KMW200CCD chiller in a secure room.

## 6. Operating Instructions

### 6.1 Warnings and Cautions



#### **WARNINGS**

**Dangerous voltages are present on the KMW200CCD's terminals when the power is turned on. To prevent personal injury and possible damage to the equipment:**

- 1. Never connect/disconnect the CCD detector power cable from the KMW200CCD when the unit is turned on.**
- 2. Turn off the unit at the mains and remove the plug before filling up the reservoir with water as live parts and rotating parts are exposed when the cover is removed.**
- 3. Ensure that the earth cable is properly connected to the KMW200CCD casing.**

### 6.2 Controls and Indicators

The controls and indicators of the KMW200CCD are located on the front panel.

The KMW200CCD is switched on/off using the mains key switch.

There are four indicator lights marked 'Ready', 'Flow', 'Level' and 'Temp'. The four lights flash when the chiller is performing its automatic water conditioning check. When the chiller is operating correctly the green 'Ready' light illuminates and the three red lights go out.

A temperature gauge indicates the temperature of the water in the reservoir.

### 6.3 Switch-on Procedure

1. Check that the water pipes and electrical cables are properly connected.
2. Switch on the KMW200CCD by turning the key switch to the right.  
The lights on the front panel will flash as the KMW200CCD performs a water conditioning check.
3. After a few seconds, check that the green 'Ready' light on the front panel is illuminated.  
This shows that there is no fault and that the CCD power is on. If the green 'Ready' light does not come on, refer to the TROUBLE SHOOTING chapter.
4. The KMW200CCD is now operational.

## 7. Maintenance Schedule

### 7.1 Introduction

Maintenance must be performed to ensure that the KMW200CCD system continues to operate safely and reliably. This is detailed in the maintenance schedule given below.

**WARNING**

**Failure to perform scheduled maintenance tasks properly and at the correct intervals can affect the safety and performance of this system.**

**WARNING**

**Before performing any maintenance task ensure that you have read and understood the HEALTH AND SAFETY INFORMATION at the beginning of this manual.**

Planned maintenance that can be performed by the user is limited to cleaning the water filters. Other maintenance tasks that the user can perform, e.g. replacing bulbs in the indicator lights and filling the reservoir with distilled water, are carried out as required. Other tasks should be carried out by the user's authorised service representative.

### 7.2 Annual Maintenance Schedule

This schedule may have to be carried out more frequently depending on the water quality and the length KMW200CCD operation.

**Tools and Materials:**

Screwdriver or flat wrench (17 mm)

Action	Personnel	Estimated task duration
1. Clean the water inlet filter	Service technician	30 minutes

## 8. Maintenance Instructions

### 8.1 Filling the Reservoir with Water

**Task Time:** 10 minutes

**When:** When the red FLOW light on the front panel is illuminated

**Tools:**

Bucket

Funnel

20 Litres of clean distilled water (maximum amount required if reservoir is empty)

**Procedure**

1. Switch off the KMW200CCD.
2. Remove the power supply plug from the MAINS IN socket.



**WARNINGS**

Ensure that the power is switched off at the mains and that the plug has been disconnected from the mains power supply before removing the top of the KMW200CCD. Dangerous voltages are present on the KMW200CCD's terminals when the power is on. Rotating parts are exposed when the top of the KMW200CCD is removed when the power is on.

3. Place a bucket beneath the overflow pipe of the KMW200CCD chiller unit.
4. Remove the water fill inlet cover.



**WARNING**

Do not allow water to splash on the electrical circuits of the KMW200CCD. Failure to prevent water coming into contact with the electrical circuits could cause an electrical shock hazard, and possible damage to the equipment.

5. Using the funnel carefully fill the reservoir, trying to avoid splashing, until the water overflows through the overflow pipe.
6. Refit the water fill inlet cover.

### 8.2 Cleaning the Water Filter

**Task Time:** 30 minutes

**When:** Once a year (dependant on water quality and length of KMW200CCD operation)

**Tools:**

Screw driver

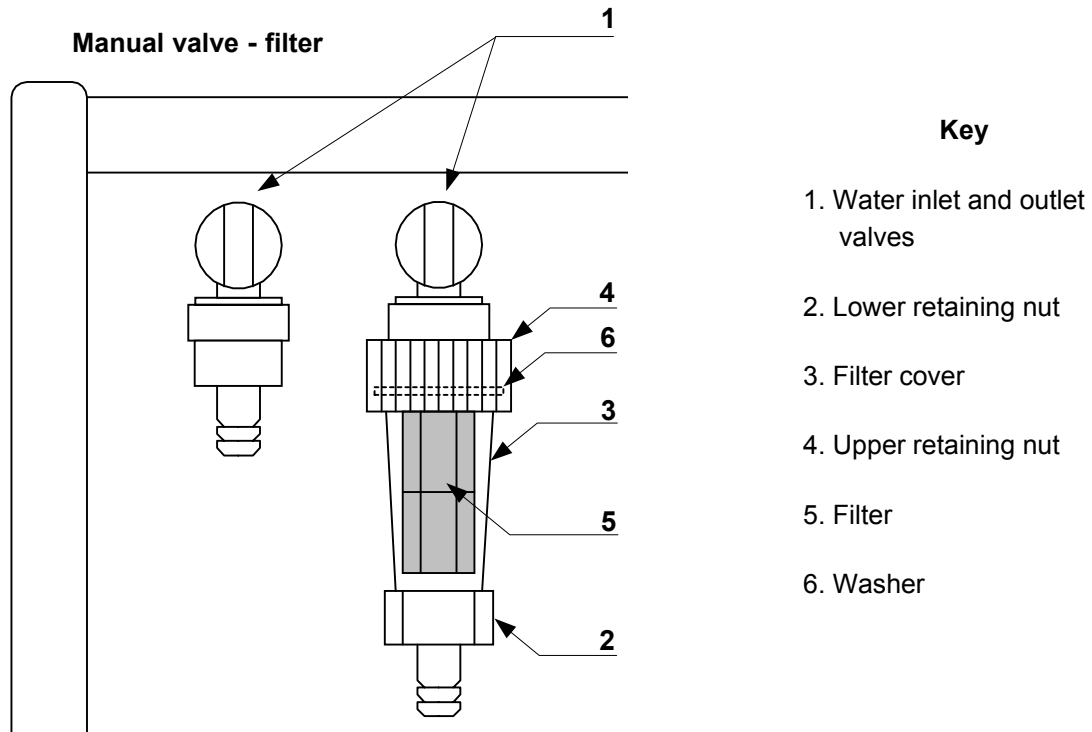
Bucket

## Funnel

20 Litres of clean distilled water (maximum amount required if reservoir empty)

### Procedure (Refer to Figure 8.3.1)

1. Switch off the KMW200CCD.
2. Disconnect the plug from the mains power supply.
3. Close the inlet and outlet valves.
4. Place a bucket beneath the water inlet valve.
5. Holding the filter cover unscrew the lower retaining nut.
6. Unscrew the filter cover whilst holding the upper retaining nut.
7. Remove the filter.
8. Clean the filter under clean running water.
9. Place the filter back in the filter cover.
10. Check the position of the washer is correct inside the nut.
11. Screw the filter cover into the upper retaining nut.
12. Screw on the lower retaining nut.
13. Open the outlet and inlet valves.
14. Re-connect the plug to the mains power supply.
15. Switch on the KMW200CCD.
16. In order to de-aerate the filter unscrew the filter cover momentarily and then re-tighten it.
17. Check for water leaks. If there are any leaks: remake the connection.



*Figure 8.3.1 Removing the Water Filter*

## 9. Trouble Shooting

Symptom	Fault	Solution
Pump stops after about 10 seconds and the red LEVEL light is illuminated	Water level in the reservoir is too low	Fill the reservoir with water (refer to the MAINTENANCE INSTRUCTIONS chapter)
Pump stops after about 10 seconds and the red FLOW light is illuminated	Rate of water flow is too low	Clean the water filter (refer to the MAINTENANCE INSTRUCTIONS chapter)
Red TEMP light illuminated and KMW200CCD stops working after 10 minutes	Temperature of the water in the water reservoir exceeds 18 °C	Cool the water in the water reservoir

### Fuses

Designators	Value	Package	Location
F1	315mA / 250V	5x20mm	Inside KMW200CCD (PCB)
F2	6.3A / 250V	5x20mm	Inside KMW200CCD (PCB)



## 10. Spares

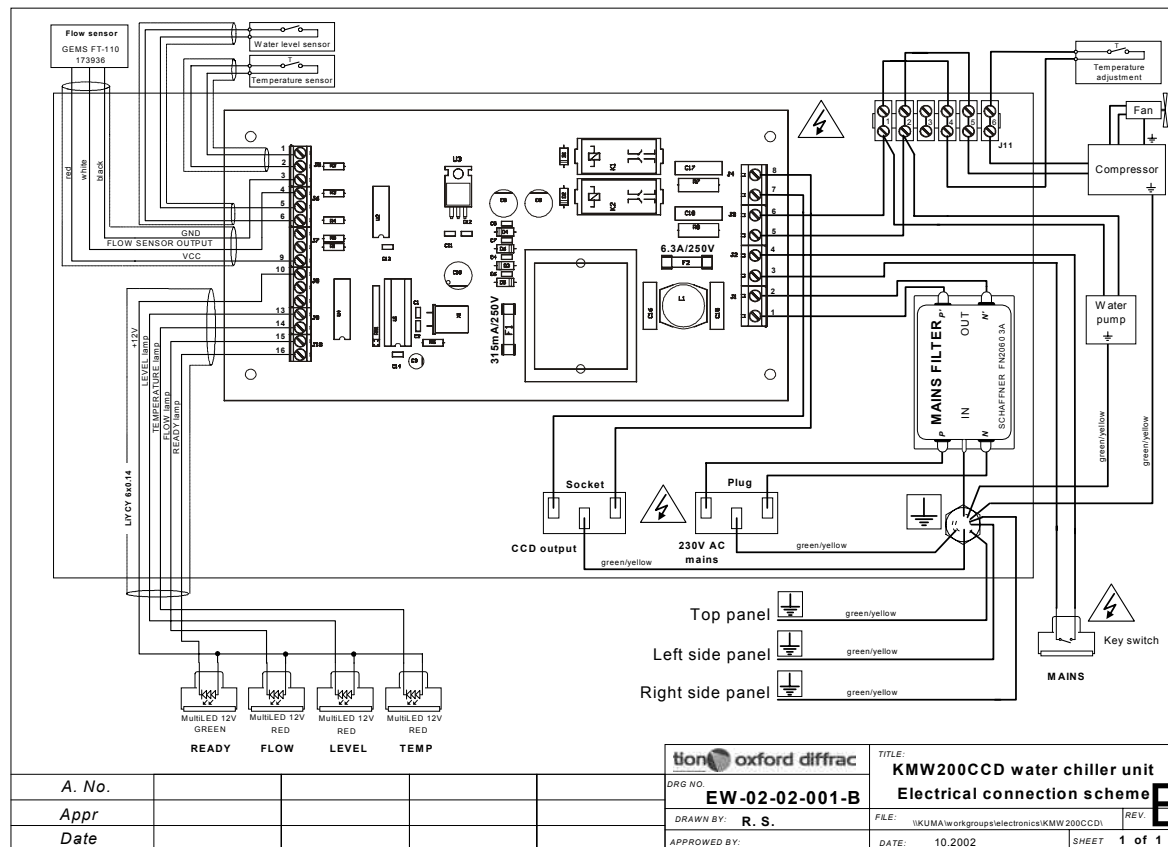
Part Number	Description
EA-04-00-015-A	Multi-LED 12V red
EA-04-00-016-A	Multi-LED 12V green
EA-10-00-002-A	Fuse T315mA/250V 5x20mm
EA-10-00-010-A	Fuse T6.3A/250V 5x20mm
EA-11-00-017-A	Control board

# 11. Additional Information

## 11.1 Drawings

Drawing no	Title	Number of pages
EW-02-02-001-B	KMW200CCD Water Chiller Unit Electrical Connection Scheme	1

### EW-02-02-001-B KMW200CCD Water Chiller Unit Electrical Connection Scheme



# 12. CE Conformity Notice

## DECLARATION OF CONFORMITY

This Declaration of Conformity is suitable to the European Standard EN 45014, "General criteria for supplier's declaration of conformity." The basis for the criteria has been found in international documentation, particularly in: ISO/IEC Guide 22, 1982, "Information on manufacturer's declaration of conformity with standards or other technical specifications."

Oxford Diffraction's liability under this declaration is limited to that set forth in the current Oxford Diffraction Terms and Conditions of Sale.

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**Applied Council Directive(s):**

**89/336/EEC Electromagnetic Compatibility Directive (EMC)  
and amending directives 91/263/EEC, 92/31/EEC, 93/68/EEC.  
73/23/EEC Low Voltage Directive, and amending directive 93/68/EEC**

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**We, The Manufacturer:**

Oxford Diffraction Ltd  
Abingdon,  
Oxfordshire. OX14 1RL.

declare under our sole responsibility that the following equipment:

**KMW200CCD**

**Serial Number      From: CCA-002/02**

to which this declaration relates are in conformity with the relevant provisions of the following standard(s) or other normative document(s) when installed in conformance with the installation instructions contained in the product documentation:

**EN 55011** Group 1 Class A for radiated emissions.  
**EN 55011** Group 1 Class A for mains conducted emissions.  
**EN 50082-2** Conducted Immunity, ESD and EFT.  
**EN 50081-2** Generic emissions standard.  
**EN 50082-2** Generic emissions standard.

Pertinent LVD sections of:

**EN 61010-1:1993** Amendment A2:1995, Safety requirements for electrical equipment for measurement, control and laboratory use Part 1: General requirements.

**Technical Information is maintained at:**

Oxford Diffraction Ltd  
Abingdon,  
Oxfordshire. OX14 1RL United Kingdom

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**Last two digits of year of CE Marking (low Voltage Directive): 03**

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We, the undersigned, hereby declare that the product(s) specified above conforms to the listed directive(s) and standard(s).

Signature:

Full Name:  
Position:  
Date: